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A fast method for measuring the degree of depolarization

in Raman spectra. Ya. S. Bobovich and V. A. Aleksandrov.
Zavodskaya Lab. 16, 37 (1930). Light from a Hg lamp
simultaneously illuminates the sample and a soln. of fluores-
cein; the beams are projected on the upper and lower halves
of the spectrographic slit, resp. Fluctuations in the in-
tensity of illumination can be cor. for by reference to the
fluorescein spectrum. The sample tube is surrounded by a
sheet of polaroid, which polarizes the incident radiation.
C. Feldman

C.A.

A powerful illuminator for Raman spectra. *Y. S. Ilyashenko. Zhuravskaya Lab. 10, 885-0 (1950).* An illuminator based on a bank of 3 arc-shaped incandescent lamps is described and its superior performance compared with the performance of conventional sources. G. M. Kosolapoff

S.A.

Sect. A

Optics

535.375.508
 3841. On M. M. Buzukhinski's paper "Photo-
 electric method of investigating Raman spectra." L. G.
 FEDOROVICH AND YA. S. BOROVICH. Zh. Eksp.
 Teor. Fiz., 20, 1139-41 (No. 12, 1950) in Russian.
 See Abstr. 7161 (1950). Some inaccurate state-
 ments are pointed out. The increase of the light-
 transmitting power of the collimator, attained by
 reducing the focal distance at a given object-lens
 diameter and a constant slit width, is made at the
 expense of the purity of the spectrum. Hence, given
 identical diameters of the working apertures, identical
 field-of-sight angles of the object lenses, and identical
 spectrum purity requirements, a light system with a
 high light-transmitting power (short focal distance)
 does not present any gain in the light flux, compared
 with a long-focal-distance system. The authors give
 preference to wider and higher slits combined with
 long-focal-distance optics.
 P. LACHMAN

S.A.
Sect. A

Optics

535.373.5.08

5842. Reply to the letter of L. G. Fedorovich and Y. B. Shchegolev in connection with M. M. Shchegolev's paper. M.: M. Svyazovskiy. Zh. Eksp. Teor. Fiz., 28, 1141-2 (No. 12, 1950) in Russian.

See preceding abstract. The author believes that the manufacture of very wide and very high slits compatible with long-focal-distance optics in the investigation of Raman spectra presents great technical difficulties; for a normal slit height (15-30 mm), a collimator with a relative aperture 1 : 2.5 is required (e.g., achromatic lens, diam. 50 mm, focal distance 120 mm).

V. LACHMAN

BOBOVICH, Ya. S.

PA 175T80

USSR/Physics - Polarization Spectra 21 Apr 50
Combination Spectra

"Polarization in the Spectra of Combination
Scattering of Aromatic Nitro-Compounds," Ya. S.
Bobovich, M. V. Vol'kenshteyn

"Dok Ak Nauk SSSR" Vol LXXI, No 6, pp 1045-1049

Reports on some results of polarization measure-
ments on spectra of combination scattering of aro-
matic compd (e.g., $\text{NO}_2 \cdot \phi$; $\text{NO}_2 \cdot \phi \cdot \text{NH}_2$; ; $\text{NO}_2 \cdot \phi \cdot$
 Cl ; $\text{NO}_2 \cdot \phi \cdot \text{Br}$; $\text{NO}_2 \cdot \phi \cdot \text{OH}$; $\text{NO}_2 \cdot \phi \cdot \text{CH}_3$; etc.). Addn
radicals are placed variously around benzene rad-
ical. Submitted 20 Feb 50 by Acad A. N. Terenin.

175T80

BOBOVICH, Ya. S.

235T97

USSR/Physics - Raman Spectra

11 Sep 52

"Temperature Dependence of the Lines of Combination Scattering of Light [Raman Spectra]," Ya. S. Bobovich, D. K. Arkhipenko

"Dok Ak Nauk SSSR" Vol 86, No 2, pp 247-250

Discusses the temp variations in the intensities of combination lines [Raman spectra] of CCl_4 , CHCl_3 , $\text{C}_6\text{H}_5\text{NO}_2$, n-nitrotoluol, m-nitrotoluol, and naphthalene. Also acknowledges assistance of A. L. Pes'kina, who measured absorption on the Beckman spectrophotometer. Concludes that the results of

235T97

Venkateswara (Curr Sci 16, 1, 1947) are incorrect.
Thanks V. K. Prokof'yev and M. V. Vol'kenshteyn for their critical analysis of the exptl data. Submitted by Acad A. N. Terenin 12 Jul 52.

235T97

BOBOVICH, YA. S. and SOLYANON, G. S.

Structure of Aromatic Nitramines. III. Raman Spectra and Structure of the Sodium Salts of Arylnitramines, page 1332, Sbornik statey po obshchey khimii (Collection of Papers on General Chemistry), Vol II, Moscow-Leningrad, 1953, pages 1680-1686.

State Inst of Applied Chemistry

BOBOVICH, YA. S.

USSR/Physics - Isomerism

21 Mar 53

"Problem of Rotational Isomerism of 1,2-Dichloroethane and of 1,2-Dibromoethane," Yu. A. Pentin, Ya. S. Bobovich, D. B. Gurevich and V. M. Tatevskiy

DAN SSSR, Vol 89, No 3, pp 435-438

Detailed survey of subject was given by M. V. Volkenshteyn (cf. Usp. Khim. 13 (1944): "Oscillations of Molecules" 1949). Authors repeat experimental determination of energy isomerization of rotational isomers in liquid 1,2-dichloroethane and 1,2-dibromoethane using improved

272F75

photoelectric method for recording of spectra of combined scattering. Indebted to Prof. V. K. Prokof'yev and late Prof. A. V. Frost. Presented by Acad A. N. Terenin 14 Nov 52.

4

Glass spectrograph with a plane grating and of high light-gathering power—its applications in Raman spectroscopy. Ya. S. Dolgovich and M. M. Pakhomova. *Doklady Akad. Nauk SSSR* 1954, 97: 508-510. English translation issued as U.S. Atomic Energy Commission NSF-tr-222, 4 pp (1954).—The spectrograph, constructed on a single-beam principle, has a 100 mm by 90 mm diffraction grating with 1200 lines per mm and 70% of the energy in the first order. The collimator is an achromatic lens of 80 mm diam and a focal length of 450 mm. The objective lens of the camera has a light-gathering power of 1.2 at a focal length of 150 mm. The dispersion of 42 Å per mm can be nearly doubled with larger-diam. lenses. This app. decreases exposure time to less than 0.1 that of the three-prism spectrograph. Powders and solid solns have been studied in the region of 700 to 1800 cm^{-1} with the 5481-Å Hg line and cross complimentary filters to reduce the large amount of parasitic light reflected from the sides of the crystallites. The work was carried out in diffused reflected light. Paul W. Kehres.

[Handwritten signature]

BOBOVICH, Ya. S.

USSR/ Physics

Card 1/1 Pub. 43 - 40/62

Authors : Bobovich, Ya. S.

Title : Thermal dependence of Stokes' line intensities for combined diffusion of the first magnitude

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, page 710, Nov-Dec 1954.

Abstract : The report, under the title as given above, was published in DAN SSSR (Reports of the Academy of Sciences USSR) Vol. 97, No. 5, 801; Vol. 98, No. 1, 39, 1954.

Institution :

Submitted :

USSR/Physics - Photoelectric method

FD-1486

Card 1/1 : Pub 146-9/20

Author : Bobovich, Ya. S., and Gurevich, D. B.

Title : Application of photoelectric recording method molecular analysis by means of Raman spectra of scattering of light

Periodical : Zhur. eksp. i teor. fiz., 27, 318-332, Sep 1954

Abstract : Photoelectric recording equipment with a wide-aperture monochromator for weak spectra in the visible band is described. The equipment is tested in various applications to the analysis of hydrocarbon mixtures and quantitative measurements of depolarization degrees of lines of Raman spectra. Indebted to Prof V. K. Prokof'yev. Twenty-six references including 11 foreign.

Institution :

Submitted : September 4, 1953

BOBOVICH, Ya. S.

USSR/Physics - Spectral lines

Card 1/1 : Pub. 22 - 10/44

Authors : Bobovich, Ya. S.

Title : Experimental study of temperature dependence of intensities of Stock's spectral lines of combined dispersion of the first order.

Periodical : Dok. AN SSSR 98/1, 39-42, Sep 1, 1954

Abstract : Experiments were conducted to determine the degree of temperature dependence anomaly in the intensities of the Stock spectral-lines of dispersed combined-light on the frequency characteristics and the chemical bonds of various elements. Two references (1933 and 1954). Graphs; table.

Institution :

Presented by : Academician A. N. Terenin, April 3, 1954

BOBOVICH, Ya.S.

Temperature dependence of Stokes line intensities of first order
Raman spectra. Izv.AN SSSR.Ser.fiz.19 no.2:219-220 Mr-Ap '55.
(Tartu--Spectrum analysis--Congresses) (MLRA 9:1)

Bobovich, Ya. S.

USSR/Optics - Spectroscopy.

K-6

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7855

Author : Bobovich, Ya.S., Pivovarov, V.M.

Title : Photoelectric Recording of Raman Spectra of Powdered Substances.

Orig Pub : Zh. eksperim. i teor. fiziki, 1955, 29, No 5, 696-697

Abstract : Using naphthalene and n-nitrotoluol as examples, it is shown that it is possible and that it is advantageous to record photoelectrically the Raman spectra of powdered substances. A high intensity photoelectric installation was used for the investigation, along with another source of excitation -- a powerful spiral mercury tube of low pressure. Thanks to the very weak solid background of the tube, there is no need for introducing a filter into the primary beam of light to reduce the background. Placed in the secondary beam of light, to attenuate the bright excitation line $\lambda = 4358\text{\AA}$,

Card 1/2

- 81 -

Bobovich, 1955

Mut Concerning one possible interpretation of the vibrational spectra of simple silicate glasses. Ya. S. Bobovich, O. P. Girin, and T. P. Tulub. *Doklady Akad. Nauk S.S.S.R.* 105: 61-4 (1955).—An attempt was made to deduce the structure of simple silicate glasses on the basis of their vibrational spectra, which have been incorrectly interpreted previously. The Raman spectra of 2 component silicate glasses (20 mole %) and fused quartz were measured by using natural and polarized light. Particular attention was focused on the Na glass, although all the glasses manifested almost the identical spectra, except for minor intensity differences. On the basis of the strongly polarized lines at 525, 1090, and 1170 cm^{-1} , and the depolarized band at 760 cm^{-1} , common to fused quartz, it is concluded that the silicate glass structure consists of infinite metasilicate chains $(\text{SiO}_2)_n$ with quartzlike islands interspersed. The relative units of each depend on the particular glass. Mutossi's expression was adapted for linear chain mols. to calc. the force consts. and frequencies for the vibrations in each symmetry class. The calcd. and exptl. frequencies closely coincide.

Robert D. Kross

RM

Bobovich, Ya. S.

USSR/Fitting Out of Laboratories. Instruments,
Their Theory, Construction and Use

H.

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4896

Author : Pivovarov, V.M., Bobovich, Ya.S.

Title : Photoelectric Recording of Raman Spectra of Gases

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 3, 649-651

Abstract : The unit for excitation of Raman spectra of gases consists of a low pressure spectral Hg-lamp and a 4-mirror system cell. The lamp is made of Mo-glass in the shape of a spiral. The cathode is liquid, of mercury, with water cooling. Anode is hollow, of molybdenum. To facilitate ignition, the lamp is equipped with a mercury pilot anode. The cell is a Mo tube, 200 mm in length, with an internal diameter of 46 mm and 9 mm wall. The tube is fastened with bolts between two end-rings provided with connections. Four halves of spherical mirrors (reflection coefficient 98%) are set within the

Card 1/2

- 2 -

Some new data on the Raman spectrum of two types of glasses. Ya. S. Bol'shakov and I. K. Kargin. *Atom. 30: 1876-1878 (1957)*. The results of Raman measurements are given for Na and for Pb glasses. $N_A = 33, 20, 10, 5, 2, 1$ mole % Pb = 5. The results are analyzed to show that the glasses to be a completely homogeneous mixture of the elements which have not yet been analyzed.

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APPROVED FOR RELEASE: 06/09/2000

CIA-RDP86-00513R000205620012-3"

Bobovich, Ya. S.

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ATMOSPHERIC

EXPERIMENTAL

RECORDING

MEASUREMENTS

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510

BOBOVICH, Ya. S.

535.375.3 : 539.13

777. ON THE INFLUENCE OF INTERMOLECULAR INTERACTIONS ON THE INTENSITIES OF LINES IN THE COMBINATION SCATTERING (RAMAN EFFECT) OF THE FIRST ORDER

Ya. S. Bobovich and V. M. Pivovarov.

Dokl. Akad. Nauk SSSR, Vol 108, No. 4, 807-10 (1955) In Russian.

The intensities are measured for the Raman lines of the symmetrical -NO_2 vibration of p-nitrotoluene, p-nitrophenol

and p-nitroaniline in acetone and benzene solutions relative to the 1389 cm^{-1} shifts of naphthalene as standard intensity. The ratios are all greater when excited with 4358 \AA radiation than with 5461 \AA , since the former is nearer the electronic absorption band of the nitro-compounds. For p-nitrotoluene and p-nitrophenol the intensity is roughly proportional to the concentration, but there is an anomaly with p-nitroaniline for which a solution of half strength gives a slightly stronger line.

SM

BOBOVICH, Ya. S.

PRIKHOT'KO, A.F.

24(7) p.3 PHASE I BOOK EXPLOITATION 807/1365

L'vov. Universitet

Materialy X Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies printed. (Series: Itm: Fizichnyy zbirnyk, vvp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Gaser, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Lavsterg, G.S., Academician (Resp. Ed., Deceased), Neporent, B.S., Doctor of Physical and Mathematical Sciences, Pabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Fabrikant, V.A., Doctor of Physical and Mathematical Sciences, Korotkiy, V.G., Candidate of Technical Sciences, Rayevskiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., Candidate of Physical and Mathematical Sciences, and Glauberman, A. Ye., Candidate of Physical and Mathematical Sciences.

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Bobovich, Ya. S., and T.P. Tulub. Raman Spectra of Double-complex Silicate Glasses	455
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Card 15/30

Bobovich, Ya. S.

USSR/Physical Chemistry - Molecule, Chemical Bond.

B-4

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3572.

Author : Ya. S. Bobovich, T.P. Tulub.

Inst :

Title : Raman Effect of Two-Component Silicate Glasses and Their Structure.

Orig Pub: Optika i spektroskopiya, 1957, 2, No 2, 174-185.

Abstract: Frequencies, intensities and depolarization were studied in Raman spectra (excited by a powerful spiral mercury low pressure tube and recorded by the photoelectric method) of two-component sodium and potassium silicate glasses, lead metasilicate and fused quartz. A continuous Raman effect close to the exciting line was observed in spectra of specimens poor in alkalis. The curves of the frequency dependence on the percentual SiO content and the intensity dependence of some lines on the composition are given for sodium silicate glasses. Po-

Card : 1/2

-38-

USSR/Physical Chemistry - Molecule, Chemical Bond.

B-4

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3572.

larization spectra of fused quartz, some sodium silicate glasses and sodium metasilicate were produced, at which occasion great distinctions indicating a sharp difference in the structures of glasses and quartz were observed. An assumption confirmed with computation was made that two-component silicate glasses were quartz-like islets interchanging with chain formations of SiO tetrahedrons. Secular equations of the vibration frequencies of an endless chain were derived. The force constants of Si-O (free) and Si-O (bound) links equal to 7.33 and $3.79 \cdot 10^5$ dynes per cm were determined by the frequencies of 1170 (A_1) and 696 (A_2). The frequencies A_1 and B_2 computed from these constants agree well with the observed frequencies (1170, 1090, 525 - A_1 , 945 - B_2). The three first frequencies are polarized. The frequencies B were not determined. A bibliographical review is given. Bibliography with 32 titles.

Card : 2/2

-39-

BOBOVICH, YA. S.

51-2-5/15

AUTHORS: Pivovarov, V.M. and Bobovich, Ya. S.

TITLE: Intensity of the Raman scattering lines in binary liquid mixtures and the intermolecular interaction. (Intensivnost' liniy kombinatsionnogo rasseyaniya v binarnykh zhidkikh smesyakh i mezhmolekulyarnoye vzaimodeystviye.)

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy) 1957, Vol.3, No.2, pp.134-142 (U.S.S.R.)

ABSTRACT: Quantitative chemical analysis of liquid mixtures using Raman spectra is based on the assumption that line intensity of a compound is directly proportional to its concentration in the mixture. First to notice a departure from proportionality were Dadiou and Kohlrausch (Ref.1). Such departures were reported both for polar liquids with tendencies towards association and recently for non-polar liquids (Ref.2-17). The authors review briefly but critically the earlier work. The following binary mixtures were studied:- (i) acetone and carbon tetrachloride, (ii) acetone and chloroform, (iii) acetone and benzene, (iv) benzene and chloroform and (v) alcohol and benzene. The mixtures were prepared at 10% intervals by volume. The spectra were excited using a low-pressure mercury lamp whose working current of 16 A was held constant to within ± 0.2 A. This corresponds to a 1% error in the intensity. The spectra were measured photoelectrically and were repeatable to within $\pm 1.5\%$ (root-mean-square error). Integral

Card 1/3

51-2-5/15

Intensity of the Raman scattering lines in binary liquid mixtures and the intermolecular interaction. (Cont.)

intensities were measured using 25 cm^{-1} wide slit (line widths lie between 5 and 12 cm^{-1}). A possible source of systematic errors is the refractive index of liquids. The reflection at the liquid-glass boundary due to difference between the refractive indices of glass (of the container) and the liquid may cause errors of the order of 10-15%. Other errors, related to the refractive index and due to its effect on the optical geometry of the apparatus employed, may also affect the results. To estimate these systematic errors the authors calibrated their apparatus with liquid mixtures (carbon tetrachloride and hexane, benzene and hexane) whose components interact very feebly, or not at all, but have very different refractive indices. Under these conditions the refractive-index-induced errors should be greatest. It was found that in the apparatus employed by authors these errors amounted to only 2-3%. The results for the five mixtures studied are given in Figs. 2-6 as percent departures from linearity plotted against concentration. These relationships are given for several wavelengths (from 200 to 3000 cm^{-1}) characteristic of each component. The greatest departures are found for the depolarized lines, while the polarized line intensities (with exception of the $\text{C}=\text{O}$ bond

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51-2-5/15

Intensity of the Raman scattering lines in binary liquid mixtures and the intermolecular interaction. (Cont.)

vibrations in acetone) are nearly proportional to concentration. Discussion of the first derivative of polarizability along the normal coordinate of the corresponding vibration, whose square determines the Raman line intensity, leads to a conclusion that anomalies found are due to electron-vibration terms. These are affected whenever a polar and a non-polar liquid are mixed (ultraviolet spectral evidence). The authors state that further work on the ultraviolet spectra of the liquids is needed to confirm their hypothesis, but they do not make explicit the nature of interaction causing the anomalies. There are 8 figures and 35 references, 13 of which are Slavic. References quoted: 1-17.

SUBMITTED: December 3, 1956.

AVAILABLE: Library of Congress

Card 3/3

Bobovich, Ya. S.

AUTHORS: Bobovich, Ya. S. and Pivovarov, V. M.

51-3-5/14

TITLE: On the Role of Excited Electron States in Concentration and Temperature Anomalies of Intensities of Raman Scattering Lines. (O roli vozbuzhdennykh elektronnykh sostoyaniy v kontsentratsionnykh i temperaturnykh anomaliyakh intensivnostey liniy kombinatsionnogo rasseyaniya sveta.)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr.3, pp.227-236. (USSR)

ABSTRACT: Temperature dependence of intensity in Raman scattering spectra of the first order is found to be anomalous (Refs. 1-14, 34). Instead of the theoretically predicted increase of intensity with temperature, a fall of intensity is observed. A similar effect in the concentration behaviour of intensities of Raman spectra of liquids and their mixtures was observed by Bobovich and Tulub (Ref.15). Comparison of the concentration and temperature anomalies led to an attempt of discussion of both these effects from an inter-molecular interaction point of view (Refs.15, 17). This work deals with verification of the above interpret-

Card 1/3

51-3-5/14

On the Role of Excited Electron States in Concentration and
Temperature Anomalies of Intensities of Raman Scattering Lines.

- ation and relationship of the observed effects with electron-vibrational spectra. The concentration and temperature behaviours of intensities are compared for the cases close to and outside the resonance region for fully symmetrical vibration lines of the nitro group in nitrobenzene, paranitrotoluene, nitrophenol, nitrophenetole and nitroaniline. The spectra were excited with green and blue mercury lines. Acetone and benzene were used as solvents. In the concentration experiments intensities were measured for two concentrations: one close to saturation and the other one-half of the first. Measurements were made relative to an internal standard, which was the 1380 cm^{-1} line of naphthalene which was added to solutions. The temperature experiments were carried out at two temperatures of 20 and $80/90^{\circ}\text{C}$. It was found that the concentration anomalies can, but the temperature anomalies cannot, be described by parameters which give the form and position of potential curves of

Card 2/3

51-3-5/14

On the Role of Excited Electron States in Concentration and
Temperature Anomalies of Intensities of Raman Scattering Lines.

excited electron states. It is suggested that the temperature behaviour of intensities can be described in terms of matrix elements of the dipole moment of a purely electronic virtual transition. This assumption is not contradicted by the results of the study of first harmonics in the spectra of carbon tetrachloride and chloroform. Only temperature dependences of the intensities of these harmonics were studied and compared with intensities of the fundamental frequencies for the same substances. Numerical results are given in Tables 1-7. There are 2 figures, 7 tables and 34 references, 15 of which are Slavic.

SUBMITTED: January 2, 1957.

AVAILABLE: Library of Congress
Card 3/3

BOBOVICH, YA. S.

51-4-17/26

AUTHORS: Bobovich, Ya. S. and Pivovarov, V. M.

TITLE: On the Problem of Splitting of the Fully-symmetric Vibration Band of the Nitro-group in n-Nitroaniline Molecules. (K voprosu o rasshcheplenii polosy polnosimmetrichnogo kolebaniya nitrogruppy v molekulakh n-nitroanilina.)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr.4, pp.387-389. (USSR)

ABSTRACT: In the study of concentration dependence of intensities in the Raman spectra of aromatic nitro-compounds the authors have found that the NO₂ band of the fully-symmetric vibration of the nitro-group in molecules of n-nitroaniline behaved peculiarly. In the spectrum of the saturated solution of n-nitroaniline in dioxane (concentration about 1.5 mole/litre) this band consists of two components with frequencies 1340 and 1323 cm⁻¹, and the latter of these has a strong diffusion shading on the side of lower frequencies and it is stronger than the former. On dilution of the solution by a factor of

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51-4-17/26

On the Problem of Splitting of the Fully-symmetric Vibration Band of the Nitro-group in n-Nitroaniline Molecules.

five, a redistribution of intensities between these components occurs and the shading mentioned above decreases strongly. Further dilution of the solution by another factor of five leads to a disappearance of the shading and an almost complete disappearance of the component with 1323 cm^{-1} frequency. These changes in the component intensities in the doublet are not accompanied by any frequency changes. The authors suggest that the observed splitting may be ascribed to external hydrogen bonding between molecules of n-nitroaniline. This interpretation of the doublet structure of the NO_2 band is confirmed by the spectrum of o-nitroaniline in which formation of an internal hydrogen bond between amino and nitro-groups is possible: in this case the NO_2 band consists of two components separated by about 18 cm^{-1} . Further support for the proposed interpretation comes from the infrared spectra of various nitro-alcohols which can form internal hydrogen bonds. According to Urbanskiy (Ref.2) the fully-symmetric and anti-symmetric vibration bands of the nitro-group in these compounds also

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On the Problem of Splitting of the Fully-symmetric Vibration Band of
the Nitro-group in n-Nitroaniline Molecules. 51-4-17/26

have a doublet structure with 12-42 cm^{-1} separation between the components. Additional evidence confirming the external hydrogen bond hypothesis for splitting of the NO_2 band is the temperature dependence of the saturated solution of n-nitroaniline. It was found that heating of this solution to 90°C weakens considerably the low-frequency component, and this may be ascribed to destruction of the hydrogen bridges. Experiments on solutions of n-nitroaniline in acetone, including dilution of the acetone solutions by carbon tetrachloride and benzene, and on solutions of n-nitroaniline in ethyl alcohol, led to a conclusion that splitting of the NO_2 band into two components occurs not only due to interaction with the solvent but also due to interaction between the molecules of n-nitroaniline itself. It seems that the hydrogen bridge between the carbonyl and amine groups of the acetone and n-nitroaniline molecules has a similar effect on the nitro-group as direct

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51-4-17/26
On the Problem of Splitting of the Fully-symmetric Vibration Band of
the Nitro-group in n-Nitroaniline Molecules.

association, with nitro-groups taking part. Experiments with very concentrated solutions of m-nitroaniline in acetone and alcohol showed no splitting although it would seem a hydrogen bond should be formed here. One can thus speak of various cases of formation of the hydrogen bond, in particular such cases in which interaction of the π -electrons is important. Comparison of the Raman spectra of n-nitroaniline excited by green and blue lines indicated that the components observed were related to two different electron-vibrational bands. From crystallographic (Ref.10) data, one would not expect occurrence of very strong hydrogen bonds in crystals of n-nitroaniline. The present authors think that the spectroscopic data do not conflict with the crystallographic analysis. There are 10 references, 7 of which are Slavic.

SUBMITTED: March 4, 1957.

AVAILABLE: Library of Congress.
Card 4/4

Bebovich, Ya.S.
 AUTHORS: Lazarev, A.N., Tulub, T.P. and Bebovich, Ya.S. 51-4-3-28/30
 TITLE: Raman Scattering Spectra of Certain Alkoxypolysiloxanes
 (O spektrakh kombinatsionnogo rasseyaniya nekotorykh
 alkoksipolisiloksanov.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.3,
 pp. 417-418 (USSR)

ABSTRACT: Study of the structure of products of hydrolytic
 condensation of esters of orthosilicic acid
 (alkoxypolysiloxanes) is of great interest because
 of many technical applications of silico-organic com-
 pounds. Such studies may be also useful in eluci-
 dation of the spectra of silicates. The authors
 obtained photographically and photoelectrically Raman
 scattering spectra for the following compounds:
 $\text{Si}(\text{OCH}_3)_4$, $(\text{CH}_3\text{O})_3\text{SiOSi}(\text{OCH}_3)_3$, $\text{Si}(\text{OC}_2\text{H}_5)_4$,
 $(\text{C}_2\text{H}_5\text{O})_3\text{SiOSi}(\text{OC}_2\text{H}_5)_3$, $(\text{C}_2\text{H}_5\text{O})_3\text{SiOSi}(\text{OC}_2\text{H}_5)_2\text{OSi}(\text{OC}_2\text{H}_5)_3$.
 The measured values of frequencies in cm^{-1} , of the
 relative intensities and the degree of depolarization
 of lines are given in the table on p.417. To measure
 the intensities and the degree of depolarization of
 lines the photoelectric apparatus described in Ref.1

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Raman Scattering Spectra of Certain Alkoxy polysiloxanes 51-4-3-28/30

was used. The figure on p.418 gives, by way of example, the polarized spectra of tetramethoxysilane (curves a) and hexamethoxydisiloxane (curves b). A preliminary brief discussion of the results obtained is given. There are 1 table, 1 figure and 4 references of which 2 are Soviet, 1 French and 1 Swiss.

ASSOCIATION: State Optics Institute imeni S.I. Vavilov;
Institute for Silicate Chemistry, Academy of Sciences
of the USSR
(Gosudarstvennyy opticheskiy institut im. S.I.
Vavilova, Institut khimii silikatov AN SSSR.)

SUBMITTED: July 15, 1957.

1. Orthosilicic acid--Esters 2. Esters--Hydrolytic con-
densation 3. Alkoxy polysiloxanes--Scattering 4. Raman
spectra--Applications

Card 2/2

AUTHORS: Bobovich, Ya.S. and Tulub, T.P. SOV/51-5-2-21/26

TITLE: The Raman Spectra of Certain Germanium Glasses (Spektry kombinatsionnogo rasseyaniya nekotorykh germaniyevykh stekol)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 2, pp 210-213 (USSR)

ABSTRACT: The Raman spectra of glassy GeO_2 , sodium bigermanate ($\text{Na}_2\text{O} \cdot 2\text{GeO}_2$) and a mixed orthosilicate of the composition $2\text{Na}_2\text{O} \cdot \text{GeO}_2 \cdot 2\text{SiO}_2$ were obtained by photoelectric recording in natural and polarized light. Fig 1 gives the general nature of the Raman spectrum of glassy GeO_2 and the state of polarization of this spectrum. Fig 2 compares the spectra of SiO_2 (curve a) and GeO_2 (curve b) which confirm the structural similarity of these two substances. The spectra of $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ (curve a) and $\text{Na}_2\text{O} \cdot 2\text{GeO}_2$ (curve b) are compared in Fig 3. The identity of structures of germanium and silicate glasses, shown by Figs 2 and 3, is confirmed by direct calculation. Fig 4 compares the spectrum of $2\text{Na}_2\text{O} \cdot \text{GeO}_2 \cdot 2\text{SiO}_2$ (curve a) with that of the two-component silicate glass Na-40 (curve b).

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The Raman Spectra of Certain Germanium Glasses

SOV/51-5-2-21/26

This figure shows that Na_2O , in accordance with Dietzel's suggestion (Refs 6, 7), is distributed uniformly between SiO_2 and GeO_2 . There are 4 figures and 8 references, 4 of which are Soviet, 2 German, 1 French and 1 American.

ASSOCIATION: Gosudarstvennyy opticheskiy institut im. S.I. Vavilova (State Optical Institute imeni S.I. Vavilov)

SUBMITTED: March 5, 1958

Card 2/2 1. Germanium alloys--Spectrographic analysis 2. Raman spectroscopy
 --Applications 3. Mathematics--Applications

AUTHORS: Bobovich, Ya.S. and Tulub, T.P.

SOV/51-5-6-5/19

TITLE: Investigation of the Effect of Chemical Elements on the Structure of Silicate Glasses by the Study of Raman Scattering of Light
(Issledovaniye vliyaniya khimicheskikh elementov na stroeniye silikatnykh stekol metodom kombinatsionnogo rasseyaniya sveta)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 6, pp 663-670 (USSR)

ABSTRACT: The authors studied mixed metasilicates of the $\text{Na}_2\text{O}.\text{MeO}.2\text{SiO}_2$ and orthosilicates of the $\text{Na}_2\text{O}.\text{Me}_2\text{O}_3.2\text{SiO}_2$ and $2\text{Na}_2\text{O}.\text{MeO}_2.2\text{SiO}_2$ types, where Me is a trivalent or quadrivalent element respectively. The effects of the following elements were studied: Be, Mg, Ca, Sr, Ba, Zn, Cd, Pb, Al, Bi, B, Ti, Ge, Zr. Table 2 gives the values of Raman frequencies of all the glasses studied. These glasses can be divided into three groups. The Raman spectra of certain of the glasses of the first group are given in Fig 1. The polarized spectrum of the $\text{Na}_2\text{O}.\text{PbO}.2\text{SiO}_2$ glass is given in Fig 2. The spectra of the glasses belonging to the first group show an intense continuous polarized band, with a small peak (625 cm^{-1}) near the band edge and high-frequency bands with maxima near 1000 cm^{-1} . The band widths and the presence

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SOV/51-5-6-5/19

Investigation of the Effect of Chemical Elements on the Structure of Silicate Glasses by the Study of Raman Scattering of Light

of continuous spectra indicate partial space linking of the majority of SiO_4 tetrahedra via Me atoms. The 625 cm^{-1} band indicates that only a small number of Na_2O and SiO_2 molecules forms structures similar to metasilicate chains. Comparison of the Raman spectra of glasses containing Pb, Mg and B (all of which belong to the first group and are shown in Fig 3) suggests that the B--O bond has the weakest covalence. The second group of glasses includes glasses with CaO, BaO and SrO. Their spectra are given in Fig 4. These spectra have somewhat narrower bands and there are two weak depolarized maxima at 320 and 470 cm^{-1} instead of the continuous spectrum exhibited by the glasses of the first group. The spectra of the glasses of the second group are similar, with the exception of the 320 and 470 cm^{-1} bands, to the spectra of sodium-silicate glasses of the metasilicate type. This similarity is particularly noticeable for the $\text{Na}_2\text{O} \cdot \text{SrO} \cdot 2\text{SiO}_2$ glass whose spectrum is given together with that of $\text{Na}_2\text{O} \cdot \text{SiO}_2$ in Fig 5. It is concluded that in the glasses of the second group the third element, like sodium, is present as a cation and, therefore, their spectra show vibrations of metasilicate silicon--oxygen chains. The third group contains only one glass: $2\text{Na}_2\text{O} \cdot \text{TiO}_2 \cdot 2\text{SiO}_2$. Its spectrum is shown

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Investigation of the Effect of Chemical Elements on the Structure of Silicate Glasses by the Study of Raman Scattering of Light

in Figs 6 (in unpolarized light) and 7 (in polarized light). An intense polarized band is observed at 875 cm^{-1} (Fig 7). A continuous polarized spectrum is also observed and its edge is displaced to $750\text{--}800\text{ cm}^{-1}$. Two wide bands: one depolarized at 345 cm^{-1} and the other polarized at 710 cm^{-1} are observed against the continuous background. There is also a weak depolarized satellite (at 1015 cm^{-1}) of the 875 cm^{-1} band. This spectrum indicates that there are vibrations of free SiO_4 tetrahedra and of a complex space network of $\text{SiO}_2\cdot\text{TiO}_2$. The edge of the continuous spectrum is displaced towards higher frequencies because of the high strength of the Ti-O bond. Conclusions about the structure of glasses obtained using the Raman spectra were found to agree with the results of other indirect methods. There are 7 figures, 2 tables and 25 references, 11 of which are Soviet, 4 American, 4 English, 3 German, 2 translations and 1 French.

SUBMITTED: January 30, 1958

Card 3/3

AUTHORS: Bobovich, Ya. S., Tulub, T. P. SOV/48-22-9-19/40

TITLE: ~~Investigation~~ of the Influence of Various Elements Upon the Structure of Silicate Glasses by the Method of Combination Light Dispersion (Issledovaniye vliyaniya razlichnykh elementov na stroyeniye silikatnykh stekol metodom kombinatsionnogo rasseyaniya sveta)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 9, pp 1086 - 1088 (USSR)

ABSTRACT: The determination of the influence of chemical elements upon the structure of this glass is an important problem both from a theoretical and a practical point of view. Mixed metasilicates of the type $\text{Na}_2\text{O} \cdot \text{MeO} \cdot \text{SiO}_2$ and orthosilicates of the type $\text{Na}_2\text{O} \cdot \text{Me}_2\text{O}_3 \cdot 2\text{SiO}_2$ and $2\text{Na}_2\text{O} \cdot \text{MeO}_2 \cdot 2\text{SiO}_2$ corresponding to bi-, tri-, and quadri-valent Me served as specimens. This choice was not made at random. It can easily be shown that by this choice it is possible to combine certain spectral features with an arbitrary glass structure. The authors investigated

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Investigation of the Influence of Various Elements Upon SOV/48-22-9-19/40
the Structure of Silicate Glasses by the Method of Combination Light
Dispersion

the influence of all important and practically accessible elements (Be, Mg, Ca, Sr, Ba, Zn, Cd, Pb, Al, Bi, B, Ti, and Zr). The majority of specimens were notable for their defects and thus were unsuited for studies by conventional experimental methods. The experience gained permits to state that these elements can be categorized into three groups according to their influence upon the general nature of the spectra. Spectra of the first and most numerous group are shown in figure 1. This group is characterized by a more or less continuous polarized dispersion. A small maximum is found near the edge, approximately keeping its position in all glass types ($\sim 625 \text{ cm}^{-1}$). An extremely wide band maximum is found at a high frequency ($\sim 980 \text{ cm}^{-1}$). The second group includes three glasses containing the oxides CaO, BaO, and SrO (Fig 2). The third group includes glass of the type $2\text{Na}_2\text{O} \cdot \text{TiO}_2 \cdot 2\text{SiO}_2$ (Fig 3). There are 3 figures and 7 references, 7 of which are Soviet.

Card 2/2

AUTHORS: Bobovich, Ya. S., Tulub, T. P. SOV/53-66-1-1/11

TITLE: The Spectra of Combination Scattering and the Structure of Some Sorts of Inorganic Glass (Spektry kombinatsionnogo rasseyaniya i stroyeniye nekotorykh neorganicheskikh stekol)

PERIODICAL: Uspekhi fizicheskikh nauk, ¹⁹⁵⁸ Vol. 66, Nr 1, pp. 3 - 41 (USSR)

ABSTRACT: The aim of the present paper was to give to the reader a survey as complete as possible on publications dealing with combination scattering in silicate glass. As an introduction the author discusses the problem itself, the investigation of the amorphous substances, the classical theory (Tamman), the physical bases (P.P.Kobeko), the mathematical (M.V. Vol'kenshteyn, O.B.Ptitsyn) and a number of experimental investigations (Refs 1 - 16). Subsequently the method of the combination scattering of light in its application to the investigation of glass is discussed (Refs 17 - 27) and finally the results of the experimental investigation are discussed. The chapters: The general character of the scattering (Refs 28 - 43); the sorts of two-component silicate glass (M.F.Vuks,

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The Spectra of Combination Scattering and the Structure of Some Sorts of Inorganic Glass SOV/53-66-1-1/11

V.A.Ioffe - sodium and lead silicate glass, Gross, Kolesova (Refs 46, 47) - connections between the frequency of the band spectra and the composition of the glass, photoelectric investigations of spectra); investigation of the influence of various chemical elements on the structure of silicate glass (Refs 26,27, Bobovich, Tulub, et al. frequencies and polarisation of the bands in the spectra of mixed ortho- and para-silicate glass, photoelectric investigations of spectra and of polarisation, schematic representation of various multi-component alkali, lead, and titanium silicate sorts); the spectra of liquid silicates - esters of the ortho-silicic acid, investigated in analogous way as silicate glass; (numerous results on frequencies, intensities, and states of polarisation of compounds of the general formula $\text{Si}(\text{OC}_m\text{H}_n)_4$ after Lazarev, Tulub, Bobovich). The last section deals with the theoretical interpretation of the spectra of scattering of some crystals compared with the experimental data obtained for some sorts of silicate and germanium glass. There are 25 figures, 5 tables, and 83 references, 40 of which are Soviet.

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The Spectra of Combination Scattering and the
Structure of Some Sorts of Inorganic Glass

SOV/53-66-1-1/11

1. Glass--Properties 2. Glass--Spectra 3. Light--Scattering

Card 3/3

AUTHORS: Bobovich, Ya.S., Perekalin, V.V. SOV/20-121-6-21/45

TITLE: An Investigation of the Structure of Unsaturated Nitrocompounds by Means of the Raman Effect (Issledovaniye stroyeniya nepredel'nykh nitrosoyedineniy metodom kombinatsionnogo rasseyaniya sveta)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 6, pp 1028 - 1030 (USSR)

ABSTRACT: A very important factor for a successful reciprocal reaction of the above mentioned compounds with nucleophilic reagents (in particular with compounds containing mobile hydrogen atoms in the methyl- and methylene groups) is the electron deficiency ($+ \delta$) on the α -carbon atom of the nitroolefin-ethylene-radical. The magnitude of this deficiency which is due to the conjugation of the nitro group with the double bond, depends to a considerable degree on the chemical structure of these nitrocompounds (on the nature of the radicals bound to the ethylene radical). For the solution of various synthetic problems, sufficient objective knowledge of the character of the conjugation in the nitroolefines was required. For this purpose this investigation of the bands of intensity of 22 unsaturated nitroderivatives, further of nitromethan and some aromatic nitroderivatives was performed.

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An Investigation of the Structure of Unsaturated
Nitrocompounds by Means of the Raman Effect

SOV/20-121-6-21/45

The spectra of most of the compounds were determined for the first time. As already known (Ref 1), the intensity values of the spectra (lines) in question change according to conjugation and therefore make it possible to estimate the latter. Besides, in this way the judgement of local changes of the electron cloud instead of the behaviour of the molecule taken in its totality is rendered possible. The results are summarized in table 1. The investigation proved that the intensity of the lines is widely variable (Table 2). For the same molecules the intensity of the antisymmetrical oscillation of the benzene ring is liable to considerable changes. The authors conclude as follows:

- 1) The unsaturated olefines represent a uniform, conjugated system.
- 2) In para-dinitroolefines (XVIII and XIX) the conjugation increases rapidly, as compared both with the corresponding meta-isomers (XXI and XXII) and with mono-nitroolefines (VI and VII).
- 3) The methyl groups on the ethylene carbon, which is combined with the nitro group, diminish the conjugation.

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An Investigation of the Structure of Unsaturated
Nitrocompounds by Means of the Raman Effect

SOV/20-121-6-21/45

- 4) The degree of depolarization of the symmetric oscillation (Ref 2) ranges for most of the compounds between 0,22 and 0,43. A.N. Terenin, Member, Academy of Sciences, USSR, and Professor B.S. Neporent have participated in this study and have made possible the spectral measuring.
There are 2 tables and 2 references, which are Soviet.

PRESENTED: April 14, 1958, by A.N. Terenin, Member, Academy of Sciences, USSR.

SUBMITTED: April 2, 1958

Card 3/3

AUTHORS: Pivovarov, V.M. and Bobovich, Ya.S.

SOV/51-6-2-25/39

TITLE: On the Temperature Dependence of Raman Line Intensities in Gaseous CO_2 and N_2 (O temperaturnom khode intensivnosti liniy kombinatsionnogo rasseyaniya gazoobraznykh CO_2 i N_2)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 249-250 (USSR)

ABSTRACT: Bobovich's experiments on Raman scattering in liquids showed (Ref 1) that the Raman line intensities decrease with increase of temperature, contradicting the theory of Raman scattering. In order to find whether this anomalous behaviour is due to interactions between molecules in the condensed (liquid) phase, the authors studied the effect of temperature on the Raman line intensities in gases. In gases the intermolecular interactions are practically absent and the Raman scattering intensities should increase with temperature. The authors studied carbon dioxide and nitrogen lines at 1289, 1388 and 2330 cm^{-1} . They used the technique and apparatus described earlier by themselves (Ref 2) and by Kiselev (Ref 3). The gases were heated by means of an electric spiral wound directly on the cell used for measurements. The intensities of the three lines listed above were measured at 40-50 and at 110-120°C. The gas pressures were 4.9 and 5.8 atm at the two temperature ranges

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On the Temperature Dependence of Raman Line Intensities in Gaseous CO₂ and N₂ SOV/51-8-2-25/39

respectively. The results, which are mean of 5-9 measurements, are given in a table on p 250. Within the experimental error which was about 2-7%, no noticeable change in the intensities of the lines studied was observed. This probably confirms that there is no temperature anomaly in the behaviour of the Raman line intensities in gases, since only a negligibly small increase of intensity could be expected on increase of temperature from 40-50 to 110-120°C. Consequently the results obtained do not contradict the hypothesis that the temperature anomalies of the Raman line intensities in liquids are due to intermolecular interactions. There are 1 table and 3 Soviet references.

SUBMITTED: July 16, 1958

Card 2/2

24(7), 24(6)

SON/51-6-4-23/29

AUTHORS: Bobovich, Ya.S. and Tulub, T.P.

TITLE: Temperature Dependence of Intensities of Stokes' Bands in the Raman Spectra of Certain Solids (Temperaturnaya zavisimost' intensivnosti stoksovykh polos kombinatsionnogo rasseyaniya v spektrakh nekotorykh tverdykh tel)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 4, pp 566-567 (USSR)

ABSTRACT: Due to inherent experimental difficulties, studies of the temperature dependence of the Raman band intensities in solids reported so far (Refs 3, 5, 6, 8, 15) were inconclusive. The authors used the latest experimental techniques to study this dependence at 300-500°K in crystalline and fused quartz, Iceland spar and two glasses (silicate glass with 24 mol.% Na₂O and 76 mol.% of SiO₂ and borate glass with 20 mol.% of BaO and 80 mol.% B₂O₃. Nichrome wire was wound on to samples and was used to heat them. Temperatures of the samples were deduced from the current in the heater circuit, to within 5-8°C. The Raman spectra were excited by means of a low-pressure mercury lamp and were recorded using an instrument DFS-12 constructed on the basis of the Kiselev double monochromator (Ref 17). To obtain reliable integral intensities, the areas under the recorded bands were measured by means of a planimeter. Complex bands were split into separated lines. The

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SOV/51-6-4-28/29

Temperature Dependence of Intensities of Stokes' Bands in the Raman Spectra of
Certain Solids

Raman band intensities in the spectra of crystalline (Figs 1, 2) and fused (Figs 3, 4) quartz and the two glasses were found to rise with temperature in agreement with theory. In some cases the rise could not be observed because it was of the same order as the experimental error. Iceland spar was the only substance which exhibited anomalous temperature dependence of the Raman band intensity. The anomaly consisted of a 30% fall in the intensity of a 1085 cm^{-1} band on increase of temperature from room to 500°K . There are 4 figures and 18 references, 9 of which are Soviet, 2 English, 4 German, 1 Dutch and 2 Indian.

SUBMITTED: October 18, 1958

Card 2/2

AUTHORS: Pivovarov, V.M., Kir'yanova, L.A., Bobovich, Ya.S., and Tarkhov, G.H. SOV/51-7-2-21/34

TITLE: Photoelectric Recording of Raman Spectra Excited with the
 $\lambda = 5875 \text{ \AA}$ Line from a Helium Lamp (Fotoelektricheskaya registratsiya
spektrov kombinatsionnogo rasseyaniya, возбужденных линий
 $\lambda = 5875 \text{ \AA}$ гелиевого лампы)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 2, pp 258-259 (USSR)

ABSTRACT: A 3000 V, 0.2 A cold-cathode spiral helium lamp working under glow-discharge conditions at $p_{\text{He}} = 2 \text{ mm Hg}$, was employed to excite the Raman spectrum (the 5875 \AA line was used). The spectra were obtained by means of a high-speed monochromator with a diffraction grating. A photomultiplier FEU-27 was used as a receiver. This photomultiplier was sensitive to about 7000 \AA and was, therefore, able to record vibrational lines with frequencies $\sim 1600 \text{ cm}^{-1}$. The signal from the photomultiplier was amplified and recorded using appropriate parts of a spectrometer DFS-12. Fig 1 shows the spectrum of iodoxybenzene obtained in this way. The reproducibility of the results and the

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SOV/51-7-2-21/34

Photoelectric Recording of Raman Spectra Excited with the = 5875 Å Line from a Helium Lamp

resolution are illustrated on the 1004-1030 cm^{-1} doublet of toluene and the 999-1017 cm^{-1} doublet of iodoxybenzene (Fig 2). The first doublet (Fig 2a) is completely resolved, the second (Fig 2b) is resolved to the extent of about 80%. There are 2 figures and 4 references, 1 of which is Soviet, 2 English and 1 international.

SUBMITTED: January 24, 1959

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5(4)

AUTHORS:

~~Bobovich, Ya. S.~~, Perekalin, V. V.

SOV/20-127-6-26/51

TITLE:

Investigation of the Structure of Some Ethylene and Styrene Derivatives by Means of Raman Radiation

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 6, pp 1239-1241 (USSR)

ABSTRACT:

The activity of unsaturated organic nitro-compounds is subject to the conjunction of the nitro group with the double bond. In order to determine the influence upon activity when replacing the nitro group by other electrophilic groups (nitrile-, carbonyl-, carboxylic-, sulfonic-, phosphoric-groups) in conjunction, the intensity of the Raman lines corresponding to the double bond was measured. The method was already described in reference 1. Table 1 shows the frequencies and intensities (relative to benzene double linkage = 1) for ethylene derivatives, table 2 for styrene derivatives. The introduction of the nitro group into an ethylene derivative multiplies the intensity. The intensity of vinylsulfonic and vinylphosphonic compounds is - contrarily as expected - lower than in ethylene derivatives with isolated double bond. The methylene group acts like a barrier if the nitro group is separated from the double bond

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Investigation of the Structure of Some Ethylene and
Styrene Derivatives by Means of Raman Radiation

SOV/20-127-6-26/51

by the methylene group, and no increase of intensity occurs. For chloro- and bromo-allyl, however, as well as for halogen compounds of styrene no barrier effect, caused by the methylene group, may be observed. No interpretation may be given yet to explain this specific property of the halogens. In common the styrene compounds satisfy the same rules. There are 2 tables and 7 references, 5 of which are Soviet.

PRESENTED: April 23, 1959, by A. N. Terenin, Academician

SUBMITTED: April 2, 1959

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Bobovich, Ya. S.

5/072/64/000/03/021/023
2003/5008

Pyritskaya, S. E.

3rd All-Union Conference on the Vitreous State

Stable 1. Kermath, 1960, Nr 3, pp 43-46 (USSR)

The 3rd All-Union Conference on the Vitreous State was held in Leningrad at the end of 1959. It was organized by the Institute of Chemical Physics of the USSR Academy of Sciences. The conference was attended by scientists from various countries, including the USSR, Poland, Czechoslovakia, and the German Democratic Republic. The main topics discussed were the structure and properties of glasses, the mechanism of vitrification, and the physical and chemical properties of glasses. The conference resulted in the publication of a collection of papers, which is the subject of this report. The papers are divided into two main sections: "On the Problems of Conformation of the Vitrification" and "On the Problems of the Structure and Properties of Glasses". The first section contains papers by A. G. Vlasov, A. E. Duvvalter, and V. V. Karasov. The second section contains papers by A. G. Vlasov, A. E. Duvvalter, and V. V. Karasov. The papers discuss the problems of conformation of the vitrification, the structure and properties of glasses, and the physical and chemical properties of glasses. The papers are written in Russian and are intended for the scientific community.

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Card 2/6

Glasses form one component with the help of infrared spectroscopy. The molecular structure and properties of glasses are discussed. The papers are written in Russian and are intended for the scientific community. The papers discuss the problems of conformation of the vitrification, the structure and properties of glasses, and the physical and chemical properties of glasses. The papers are written in Russian and are intended for the scientific community.

Card 3/6

BOBOVICH, Ya.S.; PEREKALIN, V.V.

Investigation of the structure of some unsaturated compounds by means of Raman spectra. Zhur. strukt. khim. 1 no.3:313-318 S-O '60. (MIRA 14:1)

1. Gosudarstvennyy opticheskiy institut imeni S.I. Vavilova, Leningrad. (Unsaturated compounds--Spectra)

24.6100

68310

SOV/51-8-1-8/40

AUTHORS: Bobovich, Ya.S. and Tsenter, M.Ya.TITLE: On the Polarization Ratios in the Raman Spectra⁷¹ of Molecules with Strong Conjugation

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 1, pp 46-50 (USSR)

ABSTRACT: The authors investigated the effect of conjugation on polarization of the Raman lines of 26 aromatic compounds. All measurements were made photoelectrically using apparatus described earlier (Refs 6, 8, 9). An industrial version of DFS-12 was employed. The spectra were excited with the blue line of mercury at 4358 Å. The degrees of depolarization, ρ , of various lines of the 26 compounds are given in Table 1. This table shows that in the majority of compounds the value of ρ is close to 0.5. This happens in characteristic vibrations of individual bonds such as NO, C=C, C≡C, C≡N, in fully symmetric and antisymmetric vibrations of the NO₂ group, and in complex vibrations of the benzene, naphthalene, furan and thiofuran rings. The observed effect is due to strong conjugation in a direction along which the polarizability α has the greatest value (mainly due to de-localized π -electrons). Then

Card 1/2

68310

SOV/51-8-1-8/40

On the Polarization Ratios in the Raman Spectra of Molecules with Strong Conjugation

for any vibration the ellipsoid $\partial\alpha/\partial q$ (where q is a normal vibrational coordinate) is strongly elongated in the direction of maximum α . Theory shows that in such a case the degree of depolarization of Raman lines should be very close to 0.5. There are 2 tables and 10 references, 9 of which are Soviet and 1 translation into Russian.

SUBMITTED: June 4, 1959

✓

Card 2/2

TULUB, T.F.; BOBOVICH, Ya.S.

On the effect of the refractive index on the temperature dependence
of Raman scattering band intensities. Opt. i spektr. 9 no.5:669-
670 N '60. (MIRA 13:11)

(Raman effect)

(Refractive index)

BOBOVICH, YAS.

PHASE I BOOK INFORMATION 807/5131

Leningrad. Universitet)

Molekularnaya spektroskopiya (Molecular Spectroscopy) [Leningrad, Izdat-vo
Leningr. univ., 1960. 190 p. 4,700 copies printed.]

Red. M. I. P. I. Skripov. Eds.: Ya. V. Shchemel'eva and V. D. Mastrov;
Tech. Ed.: S. D. Yablonskii.

PURPOSE: This collection of articles is intended for scientific workers,
lecturers and students of physics and chemistry. It may also be used
by engineers and technicians employing molecular spectroscopy.

CONTENTS: The collection of articles describes spectroscopic studies of
liquids and solutions, and includes data on applied molecular spectroscopy.
Individual articles deal with the molecular interaction in solutions, and
specifically with the hydrogen bond problem. There is also an article on the utiliza-
tion of spectral apparatus and on the analytical application of molecular
spectroscopy are also included.

Aspects of the structure of high and low molecular compounds and of molecular
complexes are also covered. The collection was published in honor of the 70th
birthday of Professor Vladimir Khayflich Chelakovskii, Soviet specialist
in molecular spectroscopy and spectral analysis. There are no references.

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(27)

S/051/60/009/006/007/018

E201/E191

AUTHORS: Bobovich, Ya.S., and Tulub, T.P.

TITLE: The Temperature Dependence of the Raman Band Intensities in Crystalline and Vitreous Solids. I. An Experimental Study in the Stokes Region of the Spectrum

PERIODICAL: Optika i spektroskopiya, 1960, Vol.9, No.6, pp 747-753

TEXT: The temperature dependence of the Raman band intensities in the Stokes region was obtained for crystalline quartz, Iceland spar, fluorite, corundum, barytes, fused quartz, alkali glass, polymethylmethacrylate and polystyrene. Details of the experimental technique are given in an earlier paper (Ref.11). The main results are listed in Tables 1-2 and shown in Figs 1-3. Tables 1 and 2 give the Raman intensities at two temperatures for barytes (Table 1) and polymethylmethacrylate (Table 2). The Iceland spar spectra at room temperature (curve a) and at 540 °K (curve 6) are given in Fig.1. The temperature dependences of the intensities of the 330 cm⁻¹ Raman band of fluorite and of the 400 cm⁻¹ Raman band of fused quartz are shown in Figs 2 and 3 respectively; curves denoted by 1 in Figs 2 Card 1/2

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S/051/60/009/006/007/018
E201/E191

The Temperature Dependence of the Raman Band Intensities in Crystalline and Vitreous Solids. I. An Experimental Study in the Stokes Region of the Spectrum

and 3 are experimental, curves denoted by 2 are theoretical. Except for Iceland spar and polymethylmethacrylate, the temperature dependence of the Stokes bands agreed qualitatively with theory, i.e. the band intensity rose with temperature. The results were explained in terms of internal fields, using the refractive index and permittivity of a given solid. Acknowledgement is made to N.G. Bakhshiyev for his advice. There are 3 figures, 2 tables and 22 references: 15 Soviet, 2 English, 3 German, 1 Dutch and 1 Indian.

SUBMITTED: March 8, 1960

Card 2/2

S/051/61/010/003/009/010
E032/E514

AUTHOR: Bobovich, Ya. S.

TITLE: Raman Spectrum of Titanite (Sphene; CaTiOSiO_4)

PERIODICAL: Optika i spektroskopiya, 1961, Vol.10, No.3, pp.418-420

TEXT: The determination of the structure of vitreous bodies can frequently be simplified by the simultaneous study of their crystalline analogues. The present author has determined the Raman spectrum of titanite. It is stated that this spectrum has not previously been investigated. The specimens of the mineral were relatively fine, slightly yellow and only partly transparent crystals of various origins. This necessitated the design of a special container suitable for the investigation of powders. The container is shown in Fig.1 in which 1 is the cone containing the material, 2 is external silvering, 3 is an outer container, 4 is a bath and 5 is a conical joint. The small crystals of the mineral were attached to the outer surface of the glass cone 1 covered with picein. In order to reduce unwanted scattering at the specimen-air boundary, the cone was immersed in a water bath (4). A double monochromator with photoelectric recording ($\Delta\Phi C-12$, DFS-12)

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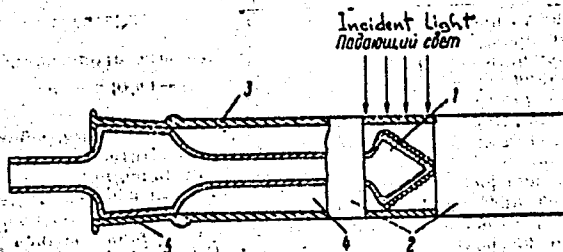
Raman Spectrum of Titanite...

S/051/61/010/003/009/010
EO32/E514

was used to record the spectrum. Fig.2 shows the Raman spectra of titanite (a) and of the $37 \text{ Na}_2\text{O}-25 \text{ TiO}_2-38 \text{ SiO}_2$ glass (b). Comparison of the two spectra shows that they are not similar. It follows that the structure of the two bodies is quite different. The overall conclusion is that the interpretation of the spectrum of the titanium-containing glass put forward by the author and T. P. Tulub (Ref.7) is not excluded by the present results and may still be correct. There are 2 figures, 1 table and 7 references: 2 Soviet and 5 non-Soviet.

SUBMITTED: September 29, 1960

Fig.1



Card 2/3

Raman Spectrum of Titanite...

S/051/61/010/003/009/010
E032/E514

Fig. 2



Card 3/3

24,7200

24419
S/051/61/011/001/006/006
E036/E435

AUTHORS: Bobovich, Ya.S. and Bursian, E.V.

TITLE: Combination scattering spectrum of barium titanate

PERIODICAL: Optika i spektroskopiya, 1961, Vol.11, No.1, pp.131-132

TEXT: A brief report of the combination scattering spectrum of BaTiO_3 . The crystals' dimensions were 2 to 3 mm and were grown by the Blattner method from solution in BaCl_2 and heated in alcohol vapour at 600 to 700°C. The absorption spectrum of crystals of this type in the visible range has been given in the paper of M.S.Kosman and one of the authors (Ref.3: DAN SSSR, 115, 483, 1957). The Curie point, determined visually from the disappearance of the domain structure, was $119 \pm 2^\circ\text{C}$. The crystals had marked ferroelectric properties with a rectangular hysteresis loop. X-ray methods gave the lattice parameters $a = 3.996 \pm 0.002 \text{ \AA}$, $c = 4.028 \pm 0.002 \text{ \AA}$. The crystal faces investigated had not been machined, a point the authors consider of importance. The combination scattering spectra was executed by a method completely analogous to that described by the author previously (Ref.4: Ya.S.Bobovich. Opt. i spektr., 10, 418, 1961). The absorption was Card 1/3

24419

S/051/61/011/001/006/006
E036/E435

Combination scattering ...

such that the exciting radiation (the mercury line $\lambda = 4358 \text{ \AA}$) penetrated several hundredths of a mm. This ensured that the observed spectrum arose from volume scattering. The spectrum (ν, cm^{-1}) is shown in Fig.1. It is argued from the very narrow half widths of the lines, roughly three times less than those of the infrared absorption band, that the bands are mainly due to the oscillation of the bonds of the TiO_6 octahedra. The authors apply the terminology of Kohlrausch (in his book on Combination scattering spectra, Russian transl., 1952) and they attribute the 695 cm^{-1} band to oscillations of the type A_{1g} (possibly ω_1) and the 500 and 550 cm^{-1} bands to the components of the doubly degenerate oscillation of type $E_g(\omega_2)$. A complete analysis of the oscillation spectrum of BaTiO_3 crystals will be given later. There are 1 figure and 9 references: 4 Soviet-bloc and 5 non-Soviet-bloc. The four references to English language publications read as follows: J.T.Last. Phys.Rev., 105,1740,1957; P.S.Narayanan. Proc.Ind.Acad.Sci., 32A, 279, 1950; B.Dayal. Proc.Ind.Acad.Sci., 32A, 304, 1950; P.S.Narayanan. Proc.Ind.Acad.Sci., 37A, 411, 1953.

Card 2/3

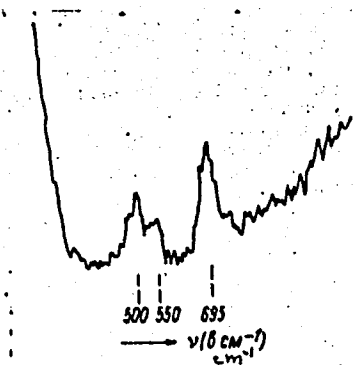
24419

Combination scattering ...

S/051/61/011/001/006/006
E036/E435

SUBMITTED: February 1, 1961

Fig.1.



Card 3/3

BOBOVICH, Ya.S.

Band intensity in Raman spectra and nature of the chemical bonds. Opt. i spektr. 11 no.2:161-168 Ag '61.
(MIRA 14:8)

(Raman effect)
(Chemical bonds)

BONDVICH, Ya.S.

Second-order Raman spectra in certain fluids. Opt. i spektr.
11 no.3:342-348 S '61. (MIRA 14:9)
(Raman effect)

SOPOVA, A.S.; PEREKALIN, V.V.; BOBOVICH, Ya.S.

Synthesis of dihydrofuran derivatives. Zhur.ob.khim. 31 no.5:
1528-1532 My '61. (MIRA 14:5)

1. Leningradskiy pedagogicheskiy institut imeni A.I.Gertsena.
(Furan)

BOBOVICH, Ya.S.; KVITKO, S.M.; PEREKALIN, V.V.

Study of the structure of nitroaminobutadiene derivatives
by means of Raman spectroscopy. Dokl. AN SSSR 139 no.6:1392-
1395 Ag '61. (MIRA 14:8)

1. Predstavleno akademikom A.N.Tereninym.
(Butadiene—Spectra)

BOBOVICH, Ya.S.; TULUB, T.P.

Raman spectra of alkali-germanium glasses. Opt. i spektr. 7
no.4:489-492 Ap '62. (MIRA 15:5)
(Glass) (Raman effect)

55310

1273, 1282 1153

33638

S/051/62/012/001/006/020
E075/E436

AUTHORS: Tsenter, M.Ya., Bobovich, Ya.S.

TITLE: Investigation of the polarization spectra of combined diffusion in relation to the frequency of excitation light

PERIODICAL: Optika i spektroskopiya, v.12, no.1, 1962, 54-59

TEXT: The authors investigated the relation between the degree of depolarization ρ and the frequency of excitation light for the following 14 compounds

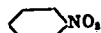
I*

CH₃NO₂

II*



III**



IV



V



VI



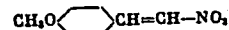
VII***



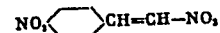
VIII



IX



X



XI



Card 1/4

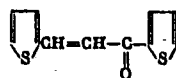
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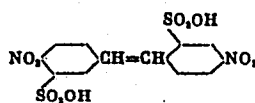
EO75/E436

Investigation of the polarization ...

XII



XIII



XIV



All spectra were excited with the light of blue and green mercury lines (4358 and 5461 Å respectively) and were registered photo-electrically with the aid of apparatus ДФС-12 (DFS-12). Measurements were made of the degree of depolarization of the lines of the fully symmetrical vibration of nitrogroup and double bond C=C, antisymmetrical vibration of benzene ring and two unidentified vibrations of thiophene ring. Acetone served as a solvent for compounds (II) and (IV) to (XII), benzene for compound (I), dichloroethane for (XIV) and water for (XIII). Absorption spectra of some of the compounds were determined by using spectrophotometer СФ-4 (SF-4). Isolation of the polarized Card 2/4

33638

S/051/62/012/001/006/020

Investigation of the polarization ... E075/E436

components of the lines was carried out by the method of D.H.Rank and R.E.Kagarise (Ref.5: J. Opt. Soc. Amer., v.40, 1950, 89). Errors in the determinations of ρ did not exceed 0.02 to 0.03. For the nitro-group in nitromethane (I), ρ was calculated using M.V.Vol'kenshteyn's equation (Ref.9: Vibrations of molecules. v.2. GTTI, M.-L., 1949)

$$\rho = \frac{6\rho_N}{6 - \frac{N-1}{2N} \cdot 3 \sin^2\varphi(6 - 7\rho_N)} \quad (1)$$

where ρ - degree of depolarization of individual bond;
 ρ_N - measured depolarization of the vibrations of equivalent bonds;
 N - number of such bonds and φ - angle between the bonds.
 For $\varphi = 125^\circ$, ρ is near to 0.5. It is thought that the fully symmetrical vibration of nitro-group is caused in different degrees by two transitions: one polarized along the axis of the molecule and the other perpendicular to the axis. For nitrobenzene (III), ρ is lowered and grows steadily with increasing conjugation reaching the value of 0.5. It was shown that ρ does not depend

Card 3/4

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S/051/62/012/001/006/020

Investigation of the polarization ... E075/E436

on the frequency of excitation light. Eq.(1) probably does not apply to nitrobenzene and the other more conjugated compounds, for which application of the equation gives values of ρ much greater than 0.5. The authors conclude that for all the compounds investigated there exists only one longwave polarized transition. It is thought possible that for the vibrations studied several electronic transitions took place, all equally polarized. There are 1 table and 16 references: 11 Soviet-bloc and 5 non-Soviet-bloc. The references to English language publications read as follows: Ref.3: N.S.Bayliss, E.G.McRae. J. Phys. Chem., v.58, 1954, 1002; Ref.5: D.H.Rank, R.E.Kagarise. J. Opt. Soc. Amer., v.40, 1950, 89; Ref.10: D.G.Rea. J. Molec. Spectrosc., v.4, 1960, 499. X

SUBMITTED: January 9, 1961

Card 4/4

BOBOVICH, Ya.S.

Use of Raman spectra in studying the structure of glassy
phosphates. Opt. i spektr. 13 no.4:492-497 0 '62. (MIRA 16:3)
(Raman effect) (Glass-Spectra)

S/051/62/013/005/008/017
E039/E420

AUTHOR: Bobovich, Ya.S.

TITLE: On the structure of the beryllium halides in concentrated aqueous solution

PERIODICAL: Optika i spektroskopiya, v.13, no.5, 1962, 673-675

TEXT: The Raman spectra of aqueous solutions of the Be halides were studied as no data on this subject are available. Pure beryllium bromide is prepared by the action of concentrated hydrobromic acid on chemically pure beryllium acetate. The spectra are recorded on a DQC-12 (DFS-12) spectrograph and show a diffuse band structure with a half-width of $\sim 60 \text{ cm}^{-1}$ for BeCl_2 and two overlapping bands of a half-width larger than 400 cm^{-1} for BeBr_2 . In the case of the chloride the 530 cm^{-1} band is strongly polarised while for BeBr_2 the 500 cm^{-1} band is partially polarised. A polymer structure $(\text{BeCl}_2)_n$ is suggested for dissolved BeCl_2 . This is discussed in relation to the structures observed by means of X-ray diffraction for the anhydrous crystal form of BeCl_2 and also for its vapour. It is concluded that the halides of beryllium in concentrated aqueous solution have the

Card 1/2

On the structure of the beryllium ...

S/051/62/013/005/008/017
E039/E420

form of an infinite chain. Comparison is made with the structure of aluminium bromide and chloride. There is 1 figure.

SUBMITTED: August 26, 1961

Card 2/2

35731

S/020/62/143/002/015/022

B145/B138

11-7211

AUTHORS: Kvitko, S. M., Perekalin, V. V., Vasil'yeva, V. N.,
Bobovich, Ya. S., and Slovokhotova, N. A.

TITLE: Synthesis and structure of nitrobutadiene derivatives

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 345 - 347

TEXT: Some nitrobutadiene and nitraminobutadiene derivatives were synthesized, and their structure was examined, in order to establish the effect of the chemical structure of nitralkenes and nitralkenedienes upon their polymerizability. The reaction scheme indicates the synthesis course as well as the products obtained. This is the first case of a C-chain condensation with malonic acid aldehyde. A ketimino - enamino tautomerism can be dismissed for products of the Knoevenagel condensation. It was not possible to alkylate nor to acylate the amino and nitraminobutadienes. The spatial structure of compounds II to X (see diagram) was examined by Raman spectra and by measuring the dipole moments. III and IV (compound IV is not indicated in the diagram; its structure is the same as that of

Card 1/3

Synthesis and structure ...

S/020/62/143/002/015/022
B145/B138

VII - IX, except that there is $\text{-NC}_6\text{H}_5$ instead of -CRR') exhibit intramolecular H bonds; the nitro group is in cis-position with respect to the amino group. Compounds V - VIII do not possess a plane structure. The nitro group (at the C-N bond) as well as the vinylidene residue (at the C-C bond of the butadiene grouping) are deflected here. The H bonds are also weakened thereby, which results in a displacement of the fully symmetric vibration band of the nitro group toward shorter wavelengths ($\nu = 1350$). IX exhibits a high dipole moment (7.5 D), which is explained by assuming a structure in which the dipole moments of the two nitrile groups add. A characteristic of the Raman spectra of nitraminobutadienes was found to be the splitting of the fully symmetric vibration of the nitro group, which may be caused by the intramolecular H bonds or the Fermi resonance. When examining the concentration dependence no redistribution of intensities was observed. Hence, the splitting cannot be caused by intermolecular H bonds. The intensity of the nitro-group bands is considerably higher in aromatic derivatives (IV:140) than in aliphatic ones (VI:12). This circumstance indicates the inclusion of an aromatic ring in the conjugation through the amino group. The low intensity of double bond

Card 2/3

Synthesis and structure ...

S/020/62/143/002/015/022
B145/B138

vibration is explained by the weakening effect of the H ring upon the double bond. The vibrational intensities in double bond and antisymmetric $-C_6H_5$ are relatively high for IX and X (IX: 90 and 80, X: 20 and 75 ÷ 45, respectively). Evidently, a conjugation in IX, that involves all π -electrons, is of greater advantage from the energy viewpoint than would be a conjugation, wherein only the H ring participates. In X, by contrast, the possibility that an H ring may form is lacking altogether. There are 1 table and 5 references: 4 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: D. Hathuay, M. Fleft, Trans. Farad. Soc., 45, 818 (1949).

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova
(Physicochemical Institute imeni L. Ya. Karpov)

PRESENTED: September 13, 1961, by M. I. Kabachnik, Academician

SUBMITTED: September 11, 1961

Card 3/3

BOBOVICH, Ya.S.

Study of catalyzed crystallization by means of Raman spectra.
Dokl.AN SSSR 145 no.5:1028-1030 '62. (MIRA 15:8)

1. Predstavleno akademikom A.N.Tereninym.
(Crystallization) (Raman effect)

2 4,3500 (4205)

40563
S/020/62/146/002/004/013
B104/B108

AUTHORS: Tsenter, M. Ya., Bobovich, Ya. S.

TITLE: The dependence of the Raman line intensity on the frequency of the exciting light

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 2, 1962, 333 - 336

TEXT: The frequency response of the Raman line intensity over a wide range of frequencies of the exciting light was studied for nitromethane (internal reference signal) and nitromethane solutions of carbon tetrachloride, chloroform, and benzene. The concentrations of the solutions were so chosen that the line intensities of solvent and solute were commensurable. The reference lines of nitromethane ranged from 1376 to 1401 cm^{-1} . The 4047-, 4358-, and 5461- \AA lines of Hg and the 4471-, 5016-, and 5875- \AA lines of He were used for excitation. Fig. 1 shows that the intensities can be described by $((\nu - \nu_{\text{vib}})/\nu)^2$, where ν_{vib} is the vibrational transition frequency. This result is in good agreement with published data. The position of the electron vibrational transition can be
Card 1/4

S/020/62/146/002/004/013
B104/B108

The dependence of the Raman...

determined by choosing that value of ν_e at which the frequency dependence agrees best with experimental data (Fig. 2). ν_e is the frequency of a Frank-Condon electron vibrational transition. Such semiempirical calculation shows that the same long-wave transition is essential for all the vibrations considered. There are 3 figures. ✓

PRESENTED: April 3, 1962, by A. N. Terenin, Academician

SUBMITTED: March 28, 1962

Fig. 1. Frequency response of line intensities.

Legend: (a) carbon tetrachloride, 459 cm^{-1} ; (b) benzene, 992 cm^{-1} ; (c) nitromethane, 1376 - 1401 cm^{-1} . (1) experimental data; (2)

$I \sim \left(\frac{\nu - \nu_{\text{vib}}}{\nu} \right)^2 (\nu_e^2 - \nu^2)^2 / (\nu_e^2 - \nu^2)^4$; (3) $I \sim (\nu - \nu_{\text{vib}})^4 (\nu_e^2 + \nu^2)^2 / (\nu_e^2 - \nu^2)^4$.

Fig. 2. Frequency response of the line intensity of symmetric vibrations of the nitrogroups in nitromethane solutions.

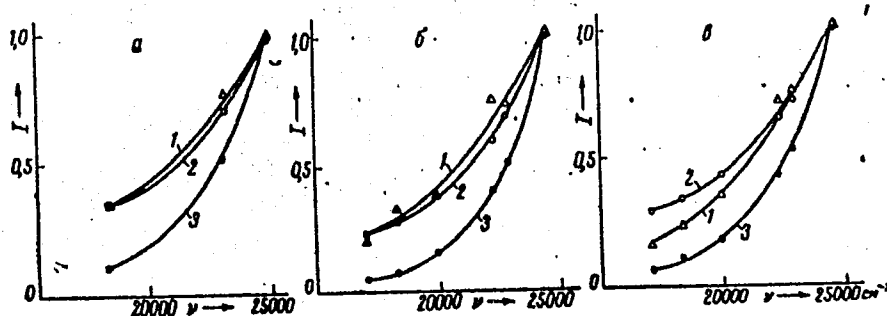
Card 2/4

The dependence of the Raman...

S/020/62/146/002/004/013
B104/B108

Legend: (1) nitrobenzene; (2) paranitrotoluene; (3) paranitrophenol; (4) paranitrophenetol; (5) nitrostyrene; (6) 1,4-bis-(β -nitrovinyl)-benzene; (7) parametoxynitrostyrene; (8) paranitroaniline. Arrows indicate semi-empirical electron vibrational transitions.

Fig. 1



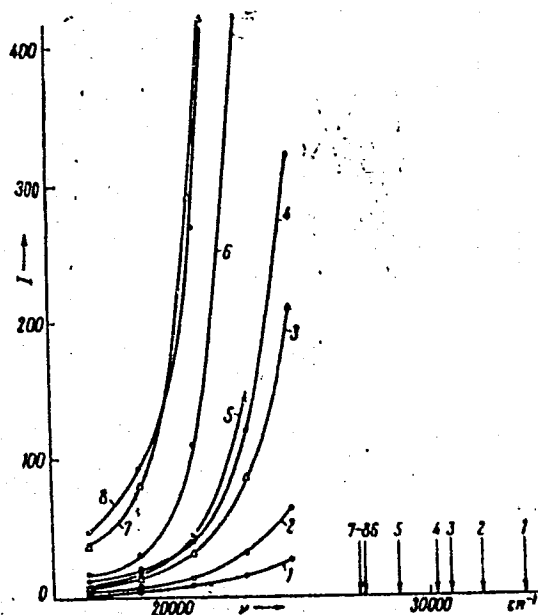
Card 3/4

The dependence of the Raman...

S/020/62/146/002/004/013
B104/B108

Fig. 2

Card 4/4



TRANSFER IMAGE SERIES 1000

ACCESSION NR: AT4019292

S/0000/63/003/001/0087/0090

AUTHOR: Bobovich, Ya. S.

TITLE: Investigation of catalyzed crystallization by means of Raman spectra

SOURCE: Simpozium po stekloobraznomu sostoyaniyu. Leningrad, 1962.
Stekloobraznoye sostoyaniye, vy*p. 1: Katalizirovannaya kristallizatsiya stekla (Vitreous
state, no. 1: Catalyzing crystallization of glass). Trudy* simpoziuma, v. 3, no. 1.
Moscow, Izd-vo AN SSSR, 1963, 87-90

TOPIC TAGS: glass, glass crystallization, Raman spectrum, spectroscopy, titanium
dioxide, catalyzed crystallization, tellurite

ABSTRACT: Samples of complex glassy systems, composed of spodumene with a small
amount of titanium dioxide, were investigated. The spectra of the initial glass of each
system, which was subjected to heating at 600, 630 and 660C, were compared with those
of samples undergoing a complete thermal treatment. The Raman spectra show that
heating the sample weakens systematically the 900 cm^{-1} band due to the vibrations of the
linked TiO_4 tetrahedra. The band at 600 cm^{-1} , characteristic for the vibration of TiO_6
octahedra, appears simultaneously. Gradual conversion from the tetrahedral to the

Cord 1/82

ACCESSION NR: AT4019292

octahedral configuration thus takes place. This conversion is completed after a prolonged thermal treatment of the sample at about 660C, as demonstrated by the complete disappearance of the high-frequency band. The band shapes do not change; they remain wide, especially for the glass-forming stage of the sample. Therefore, at this stage of thermal treatment, geometrically ordered crystallites of a definite composition are absent. The question is whether glassy materials can be built up from linked octahedra. The TeO_6 octahedra in tellurite glass, in contrast to crystalline TeO_2 , are linked mostly by corners. This ensures the flexible lattice structure necessary for the vitrification of a substance. Titanium dioxide is not suitable for forming stable glass. On further heating, the aluminum oxide and lithium oxide radicals are removed from the Ti-containing lattice and the TiO_6 octahedra are partially linked in a ribbon-like configuration. This results in an ordering of their geometrical position, i. e. the formation of crystallites analogous to rutile or more complex composition. The absence of the weak band at $\sim 220 \text{ cm}^{-1}$ in the spectra of glassy-crystalline materials is remarkable. It is due to the deformation vibrations of the lattice. The order of this lattice must especially affect these vibrations. Orig. art. has: 1 figure.

ASSOCIATION: None

Cord

2/3

BOBOVICH, Ya.S.; PETROVSKIY, G.T.

State of titanium in the products of the complete crystallization of some systems. Zhur.strukt.khim. 4 no.5:765-768 S-0 '63.
(MIRA 16:11)

1. Gosudarstvennyy opticheskiy institut imeni S.I.Vavilova.

BOBOVICH, Ya.S.; YAKHKIND, A.K.

Raman spectra of some tellurite glasses and corresponding crystals.
Zhur.strukt.khim. 4 no.6:924-927 N-D '63. (MIRA 17:4)

1. Gosudarstvennyy opticheskiy institut imeni S.I.Vavilova.

L 9850-61

EWP(q)/EWT(m)/RDS--AFFTO/ASD--Pq-Jj--LH

ACCESSION NR: AP3000582

8/0051/63/014/005/0647/0654

AUTHOR: Bobovich, Ya. S.

56

TITLE: Spectroscopic investigation of the state of coordination of titanium in some vitreous substances

SOURCE: Optika i spektroskopiya, v. 14, no. 5, 1963, 647-654

TOPIC TAGS: coordination numbers, glasses, Ti, Raman spectra

ABSTRACT: Significant information on the atomic-molecular structure of the vitreous state can be deduced from coordination numbers, if these are interpreted from the standpoint of the quantum mechanical theory of chemical bonds and the theory of directed valences. Accordingly, there were obtained the Raman spectra of titanium-containing silicate, germanate, borate and phosphate glasses and some products of their crystallization, as well as of some individual crystals with octahedral coordination of the titanium. The spectra of some of the glasses are reproduced and described. The question of coordination states is considered from the view point of donor-acceptor interaction. Interpretation of the

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experimental results indicates tetrahedral coordination of part of the titanium in glasses. It is inferred that the rest of the titanium atoms are characterized by coordination number 5. Some of the experimental difficulties are discussed. The present paper gives only a summary of the main results; a full description of the experimental data, including frequency tables and specifications of the composition of the samples, is given in an earlier report: Bobovich, Ya. S., and Tulub, P. T. (Optiko-mekhanich. promyshl., No. 9, 40, 1961). The orig. art. 3 figures.

ASSOCIATION: none

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ACCESSION NR: AP4009458

8/0051/63/015/006/0759/0765

AUTHOR: Bobovich, Ya.S.

TITLE: Spectroscopic manifestation of coordination transitions of boron in some vitreous systems .

SOURCE: Optika i spektroskopiya, v.15, no.6, 1963, 759-765

TOPIC TAGS: boron oxide, boric anhydride, borate glass, sodium borate glass, coordination number, coordination transition, Raman spectrum, vitreous structure

ABSTRACT: Although there have been numerous investigations devoted to determining the structure of borate glasses, so far there is no unanimity of opinion on the subject. In fact, different authors have arrived at different inferences even regarding the coordination number of boron in such glasses. In the present work there were obtained the Raman spectra of boron oxide, and sodium-borate glasses with 5, 7, 10, 13, 15, 16, 20, 25, 30, 33, 35, and 40 mole percent Na_2O , as well as of a few three-component glasses. Traces of some of the Raman spectra of the glasses are reproduced. In agreement with the data of other investigators, there is evinced in the Raman spectrum of boron oxide a very intense narrow line at 810 cm^{-1} ; this is accompanied

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